

**CLAIMS**

What is claimed is:

1. A reformer for a mixture of low-pressure hydrocarbon gas and steam for fueling a proton-exchange fuel cell with hydrogen from said mixture, comprising
- 5 a cylinder loosely packed with a pelletized catalyst with a cap at each end, a fuel tube for introducing said hydrocarbon gas into said cylinder at low pressure having an outflow end coupled to said cylinder through a cap at one end of said cylinder, a steam tube coaxial with said fuel tube and surrounding said fuel tube for introducing steam at a pressure higher than said low pressure hydrocarbon gas through
- 10 said cap at said one end of said cylinder, said steam tube having a tip of finite length at its outflow end that is gradually reduced in diameter over its length to form a truncated conical tip, with its open end of smaller diameter than said steam tube diameter forming an outflow end for said fuel tube, and
- 15 an outflow tube protruding outwardly from said cylinder through an end cap at an end of said cylinder opposite said one end,
- wherein said steam tube extends to said outflow end of said fuel tube not only for flowing steam to draw out said low-pressure hydrocarbon gas for mixing with said steam, but also flows through a core of said fuel outflow in a direction that is at an acute angle with the direction of fuel outflow core, which is substantially along the axis of said
- 20 coaxial fuel and steam tubes, thereby causing steam to cross said fuel outflow at an acute angle from all radial directions,
- whereby said hydrocarbon gas and steam mix before coming in contact with said loosely packed pelletized catalyst as steam and fuel mixture flows over said catalyst through said cylinder to produce a high yield of  $H_2$ , as said hydrocarbon gas is converted
- 25 into a flow of  $H_2$ , CO and  $CO_2$  through said outflow tube of said cylinder.

2. A hydrocarbon gas and steam reformer as defined in claim 1 wherein said fuel tube has a tip of finite length at its outflow end that is reduced in diameter gradually along said finite length.

3. A hydrocarbon gas and steam reformer as defined in claim 1 wherein said  
5 hydrocarbon gas is low pressure propane, stored as liquified propane in a container for safe use aboard recreational vehicles.

4. A hydrocarbon gas and steam reformer as defined in claim 1 including a heat source around said cylinder for heating said catalyst.